PC104-386/PC104-386V/PC104-6051

Embedded 386SX PC/104 All-in-One CPU Module Series

User's Manual

(Version 3.1)

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Chapter 0
Startup

0.1 Packing List

Product Name	Function	Package
PC104-386	Embedded 386SX PC/104 All-in-One CPU Module	● **PC104-386 Embedded 386SX PC/104 Aii-in-One CPU Module** ● **Utility and Drivers Diskette x 1** ● **FDD cable x 1** ● **HDD cable x 1** ● **RS232 cable x 2** ● **Printer cable with bracket x 1** ● **AT KB connector cable x 1**
PC104-386V	Embedded 386SX PC/104 All-in-One CPU Module with onboard CRT/LCD	● **PC104-386V Embedded 386SX PC/104 All-in-One CPU Module** ● **Utility and Drivers Diskette x 1** ● **FDD cable x 1** ● **HDD cable x 1** ● **RS232 cable x 2** ● **Printer cable with bracket x 1** ● **AT KB connector cable x 1** ● **VGA cable x 1**

Product Name	Function	Package
PC104-6051	Embedded 386SX PC/104 CPU Module	● **PC104-6051 Embedded 386SX PC/104 All-in-One CPU Module** ● **Utility and Drivers Diskette x 1** ● **AT KB connector cable x 1**
PC104-386	Embedded 386SX PC/104 All-in-One CPU Module	● **PC104-386 Embedded 386SX PC/104 All-in-One CPU Module** ● **Utility and Drivers Diskette x 1** ● **FDD cable x 1** ● **HDD cable x 1** ● **RS232 cable x 2** ● **Printer cable with bracket x 1** ● **AT KB connector cable x 1**

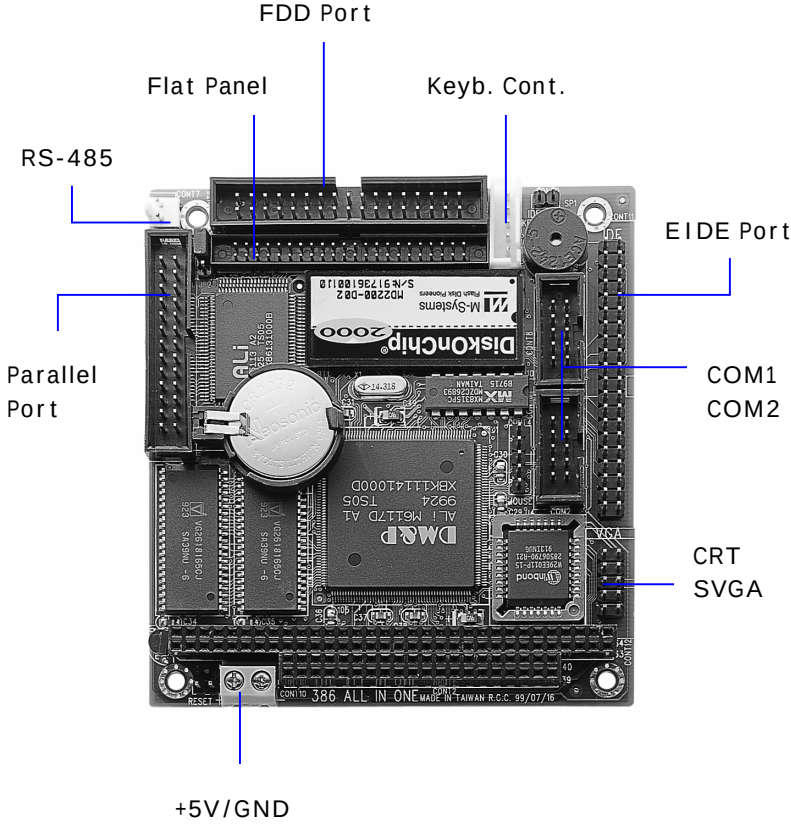
0.2 Specifications

Features	PC104-386	PC104-386V
Chipset	DM&P(ALi) M6117D	
Processor	386SX-40 on-die	
Multi I/O Chip	ALi 5113	
BIOS	AMI BIOS	
Watchdog Timer	From 30.5µs to 512 seconds	
Bus Interface	PC/104 standard compliant	
RAM	4MB onboard	
DiskOnChip Sockets	1	
Display	X	VGA/LCD
VGA CRT/LCD Chip	X	TOPRO TP65081Q
Enhanced IDE Port	1	
Floppy Connector	1	
Serial Port	RS232 X 2 (or RS232x1,RS485x1)	
Parallel Port	1	
Power Requirement	+5V @0.8A	+5V @1A
Board Weight	105g	130g
Board Size	90mm x 96mm	

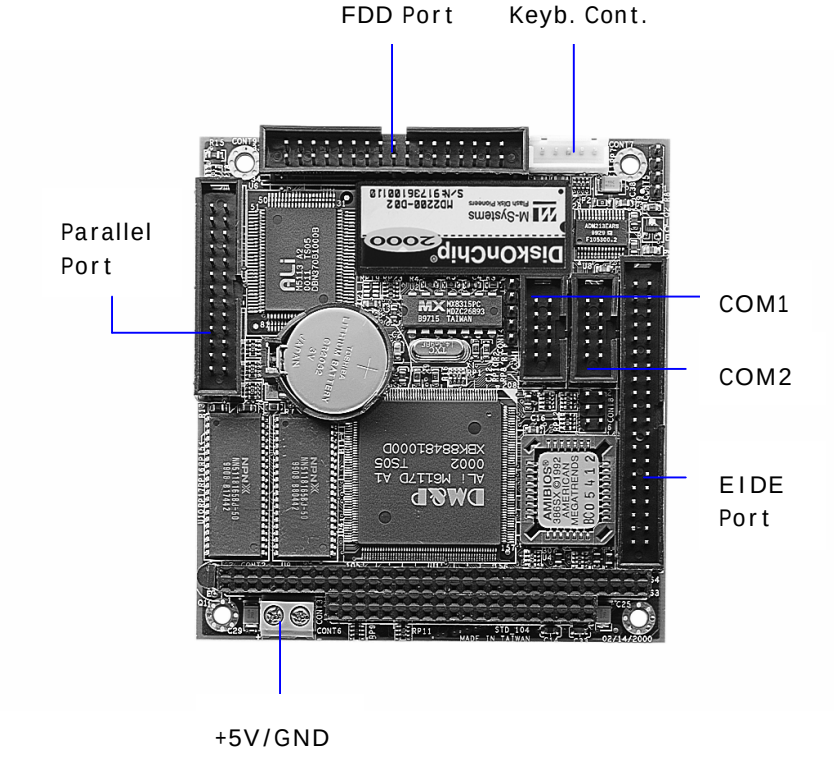
Features	PC104-386	PC104-6051
Chipset	DM&P(ALi) M6117D	
Processor	386SX-40 on-die	
Multi I/O Chip	ALi 5113	
BIOS	AMI BIOS	
Watchdog Timer	From 30.5µs to 512 seconds	
Bus Interface	PC/104 standard compliant	
RAM	4MB onboard	
Display	X	
Enhanced IDE Port	1	
Floppy Connector	1	X
Flash Disk / DiskOnChip Socket	1	x
Flash Disk / EPROM Socket	x	2
Serial Port	RS232 X 2	X
Parallel Port	1	X
Power Requirement	+5V @0.8A	+5V @0.6A
Board Weight	105g	
Board Size	90mm x 96mm	

0.3 Component Location

PC104-386V



PC104-386



Chapter 1
Introduction

1.1 Features

The contains all standard motherboard features such as : 386SX-40 compatible CPU, 4 MB DRAM onboard, CRT and Flat Panel SVGA controlle serial and parallel ports, floppy and EIDE disk controller.

The SSD modules' socket can accommodate a DiskOnChip ® 2000, a new generation of high performance single-chip Flash Disks of up to 144 MB.

The ICOP-605X is a core module for high performance control applications in demanding embedded applications. Because the module implements all key functions of a full PC/AT compatible system any standard PC compiler or debugger can be used, resultng in a significantly reduced software develop-ment cycle.

I/O and Enhanced IDE

In addition, the 605X has one PS/2 mouse port, two serial ports (RS-232 and/or RS-485), one bidirectional printer port that supports SPP, ECP andEPP modes, an enhanced IDE HDD interface that supports PIO mode 4, and a floppy disk controller.

Flash or EPROM Disk or DiskOnChip

The onboard socket can accept up to 2 MB EPROM (PC104-6051) or 1 MB Flash memory. Both sockets can by jumper setting be assigned to hold a DiskOnChip. There areno combinations possible of devices, it is either Flash EPROM or DiskOn-Chip.

Watchdog Timer

The watchdog timer optionally monitors system operation and can invoke asystem reset when your application loses control over the system. The timing of the watchdog timer is programmable by software.

1.2 Specifications

• **Embedded CPU:** DM&P(ALi) M6117D is an implementation of an INTEL compatible 386SX-40 CPU, Realtime clock, a watchdog timer and ALi's M1217B chipset

• **BIOS:** Y2K compliant AMI system BIOS

• **DRAM Memory:** 4MB EDO DRAM onboard

• **Bus Interface:** PC/104

• **Data Bus:** 16-bit

• **Bus Speeds:** PC/104 - 8 MHz

(above values are defaults, bus speeds are programmable up to 16 MHz)

• **DMA Channels:** 7

• **Interrupt Levels:** 15

• **Enhanced IDE:** supports one port and up to two hard drives or Enhanced IDE devices of PIO mode 4. BIOS enabled/disabled

• **Watchdog Timer:** generates either a RESET, NMI or an IRQ when your application loses control over the system. Optionally the watchdog can trigger a user specified interrupt. The watchdog is configurable from 30.5µS to 512 seconds (in 30.5µS segments)

• **Real-time Clock:** included in M6117D with onboard lithium battery backup for 10 years of data retention. CMOS data backup of BIOS setup and BIOS default.

• **Keyboard and Mouse Connectors:**

Internal 5-pin header for AT-keyboard

Internal 5-pin header for PS/2-mouse

High Speed Multi I/O

• **Chipset:** ALi 5113 or SMS CFDC37C669

• **Serial ports:** one high speed RS-232 port, one high speed RS-232/485 port (jumper selectable). Both with 16C550 UART and 16 byte FIFO. BIOS enabled/ disabled

• **Floppy Disk Drive Interface:** supports up to two floppy drives, 5¼" (360 KB or 1.2 MB) and 3½ " (720 KB, 1.44 MB). BIOS enabled / disabled

• **Bi-directional Parallel Port:** supports SPP, EPP and ECP mode. BIOS enabled/disabled

Environmental and Power

• **Power Requirements:**

single voltage +5 V

- **Board Dimensions:** 90 (L) x 96 (W) mm.
- **Board Weight:** 105 g
- **Extended Operating Temperature:** -20~+60 °C

1.3 VGA Interface

(PC104-386V)

- **Chipset:** TOPRO TP65081Q
- **Memory:** 1 MB onboard
- **System Bus:** 16-bit ISA bus
- **Panel Data Bus:** 24-bit
- **Display:** CRT and Flat Panel Mono/TFT/DSTN/EL
- **Supported Flat Panels:**

NEC NL-6448AC30-10 TFT 9.4" 640X480

NEC NL-6448AC30-03 TFT 9.4" 640X480

NEC NL-6448AC33-10 TFT 10.4" 640X480

NEC NL-6448AC33-13 TFT 10.4" 640X480

NEC NL-6448AC33-18 TFT 10.4" 640X480

NEC NL-8060BC31-09 TFT 12’1 800X600

NEC NL-8060AC31-02 TFT 10.4" 800X600

NEC NL-8060AC31-01 TFT 10.4" 800X600

SHARP LQ10D42 TFT 10.4" 640X480

SHARP LQ10D421 TFT 10.4" 640X480

SHARP LQ12531 TFT 12.1" 800x600

SHARP LM64C35P MONO 10.4" 640X480

Planar EL640.480-AA1 EL color 10.4" 640X480

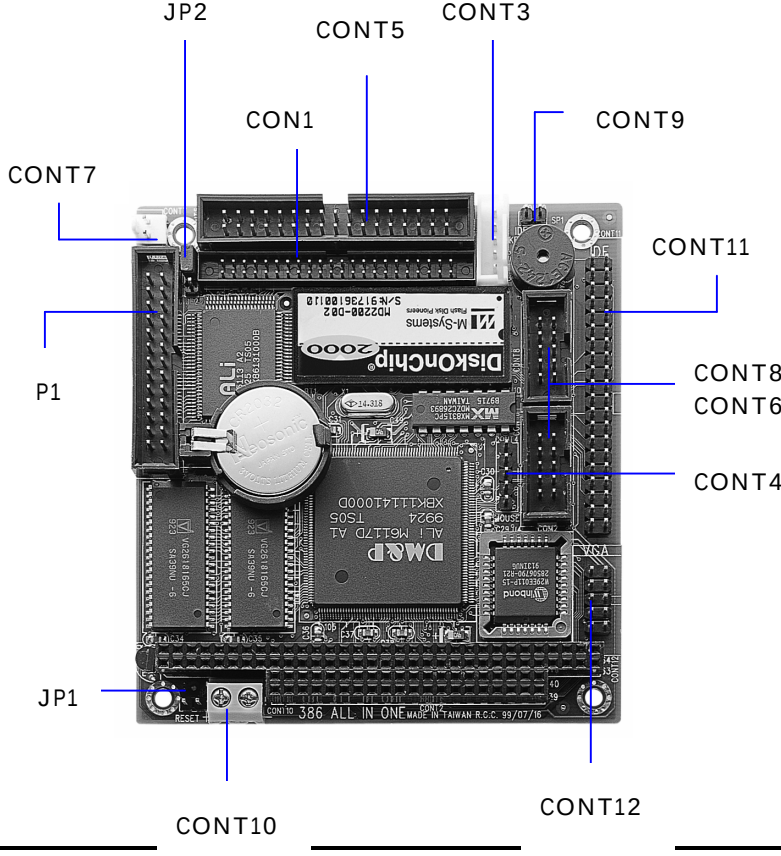
1.4 DiskOnChip 2000 Flash Disk

Flash Disk DiskOnChip ® 2000

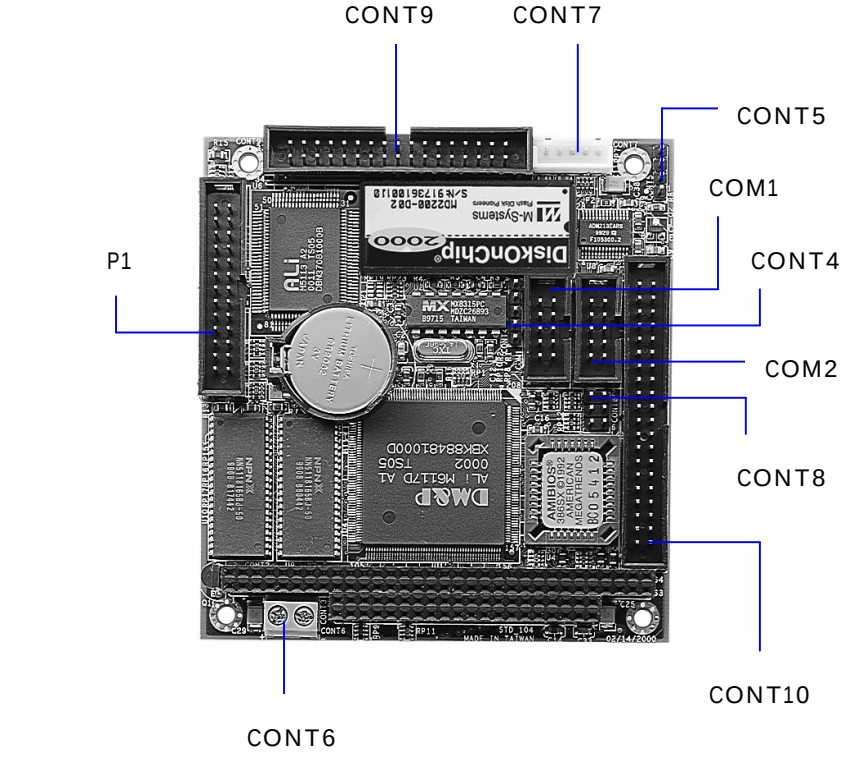
- **Package:** Single Chip FlashDisk in 32-pin DIP JEDEC
- **Capacity:** 1-144 MByte capacity
- **Data Reliability:** ECC/EDC error correction
- **Memory Window:** 8 KByte

Chapter 2
Installation

2.1 Jumper Settings



PC104-386



2.1.1 PC104-386/PC104-386V

JP1 RESET Switch

JP2 RS-232/485 selection for COM2

1-2: RS-232 mode (CONT6 active)

2-3: RS-485 mode (CONT7 active)

2.1.2 PC104-6051

JP1 RESET Switch

JP2 Flash / EPROM slection

close: EPROM Disk

open: Flash Disk

2.1.2 PC104-386

CONT6 Power connector

CONT8 ***1-2:*** RESET SWITCH

3-4: Power LED

5-6: IDE LED

2.2 Connectors

2.2.1 PC104-386/PC104-386V

CON1 Internal 44-pin Flat Panel SVGA connector **(PC104-386V)**

CONT1 PC/104 bus 64-pin

CONT2 PC/104 bus 40-pin

CONT3 AT-keyboard connector

CONT4 PS/2 Mouse

CONT5 FDD controller

CONT6 COM2 RS-232

CONT7 COM2 RS-485

CONT8 COM1 RS-232

CONT9 IDE LED

CONT10 Power Connector

CONT11 IDE connector

CONT12 CRT SVGA connector

P1 Parallel Port

2.2.2 PC104-6051

CONT1 PC/104 bus 64-pin

CONT2 PC/104 bus 40-pin

CN3 Keyboard Connector

SP1 External Speaker

U13 Socket for Flash/EPROM Disk

U14 Socket for Flash/EPROM Disk

2.2.2 PC104-386

CONT2 PC/104 bus 64-pin

CONT3 PC/104 bus 40-pin

CONT4 PS/2 Mouse

CONT5 Speaker Connector

CONT7 Keyboard Connector

CONT9 FDD controller

CONT10 IDE connector

COM1 COM1 RS-232

COM2 COM2 RS-232

P1 Parallel Port

2.3 DiskOnChip/EPROM/Flash ROM Disk

2.3.1 Setup a DiskOnChip ® 2000 Flash Disk

Installation Instructions

1. Make sure the ICOP-605X is powered OFF

2. Plug the DiskOnChip 2000 device(s) into its socket. Verify the direction is correct (pin 1 of the DiskOnChip 2000 is aligned with pin 1 of the socket)

3. Set address for both DiskOnChip devices (note that the last two settings are for normal EPROM or Flash devices)

4. Power up the system

5. During power up you may observe the messages displayed by the DiskOnChip 2000 when its drivers are automatically loaded into system's memory

6. At this stage the DiskOnChip 2000 can be accessed as any disk in the system

7. If the DiskOnChip 2000 is the only disk in the system, it will appear as the first disk (drive C: in DOS)

8. If there are more disks besides the DiskOnChip 2000, the DiskOnChip 2000 will appear by default as the last drive, unless it was programmed as first drive. (please refer to the DiskOnChip 2000 utilities user manual)

9. If you want the DiskOnChip 2000 to be bootable: a - copy the operating system files into the DiskOnChip by using the standard DOS command (for example: sys d:) b - The DiskOnChip should be the only disk in the systems or should be configured as the first disk in the system (c:) using the DUPDATE utility

For more information on DiskOnChip2000 technology, visit M-Systems Web site **http://** www.m-sys.com where you can find Utilities Manual, Data Sheets and Application Notes. In addition, you can find the lasted DiskOnChip 2000 S/W Utilities.

2.3.2 Setting up a Flash Disk

Before you can use the ICOP-605X's Flash disk you will have to initialize it using a software utility called "PC104.EXE". This program can be found on the utility disk in the subdirectory "A:\FLASH"

- Connect a keyboard and floppy disk ICOP-605X to the PC/104 bus and boot-up your system.

- run PC104.EXE (this is a DOS command line utility)

```
ICOP-605X FLASH disk initialize program V1.0

FLASH manufacturer : (1)ATMEL (2)SST

Input manufacturer number (1,2) : 1

Input quantity of FLASH (1,2) : 2

Simulation disk:

(1)DISK-A (2)DISK-B (3)DISK-C (4)DISK-D

Input manufacturer number (1,2,3,4) : 1

FLASH-DISK initialize finish.
```

(Text in bold should be entered by user)

- After running the PC104.EXE configuration program reboot the system, while holding down the left "CRTL" key. This will bring you to the "Flash Disk Utility"

- "CHANGE CURRENT DISK NUMBER" lets you select the drive you want to assign to the disk, either A, B, C or D

- "CHANGE FLASH DISK SIZE" lets you select the amount of Flash EPROM chips that are onboard.

- make selections and reboot the system after closing the program

Your disk can now be formatted and setup with normal DOS commands such as

FORMAT, FDISK, COPY, SYS etc.

Note : when assigning the solid state disk as either C or D, you first have to run FDISK before formatting the drive !

2.3.3 Setting up an EPROM Disk

EPROMs should be inserted starting from Socket. All modules have to be of the same type.

To create a ROM disk you will need the following:

- EPROM devices

- EPROM programmer

- ROM files

The ROM files are hacked-up portions of your system and program files that should have the same size as your EPROM devices.

On the utility disk you will find a program called: ROMIMAGE.EXE that will assist you in creating these files. Before using the program there are some files you will have to prepare first:

1. The system files, for example MSDOS.SYS, I/O.SYS, COMMAND.COM The program can pick these files up automatically from your boot deviceor from a bootable floppy.

2. Your application files and other necessary DOS files. Make a subdirectory that only contains these additional files. With “other DOS files” are meant files such as AUTOEXEC.BAT, CONFIG.SYS, EMM386.EXE etc

3. Prepare a directory that can temporarily hold the generated ROM files Once you prepared all the above, start the ROMIMAGE.EXE programSystem driver :

location of system files (see 1)

Source path: location of program files (see 2)

Destination path: this is where the ROM files go (see 3)

EPROM-size: depends on your choice

Simulation-disk: set this to the drive letter the ROM disk should emulate

After you have set all the right directories, use the **Analysis file** function to let the program determine how many files of what size it should generate.

After using the Analysis function go to **Create image**, and generate the ROM files. Than exit the program. In the directory that was assigned to hold the ROM files you will find your ROM images:

For example: ROM010.01 ROM010.02

Use an EPROM programmer to write the files to their EPROMs.

Beware to keep track of their sequence when inserting the EPROM’s

2.4 Watchdog Timer

The watchdog timer uses a 32.768 KHz frequency source with a 24-bit counter. Its time range stretches from 30.5 ms to 512 sec. with a resolution of 30.5 ms. When the watchdog times out a System RESET, NMI or IRQ can be invoked. Watchdog timer control and the 24-bit counter itself occupy 6 consecutive 8-bit address locations.

When functioning properly the system resets the watchdog timer periodically to prohibit that it times out. If the watchdog timer times out, it will RESET the system, or generate and NMI or IRQ, depending on its configuration.

Watchdog or System Timer

Another great application is to generate a periodic IRQ signal. Under DOS environment, the 8254, system timer 0, will generate IRQ0 every 54.9 ms. The watchdog is like system timer 0. It can be programmed to periodically generate a configurable IRQ. It may be clear that the selected IRQ, will be no longer available to the system.

Configuring the Watchdog Timer in the BIOS

The M6117D watchdog configuration register can be controlled by software or can be setup in the BIOS. To do so go to BIOS Setup's "Advanched Chipset Setup"

Watchdog Function = Enable/Disable

Watchdog Signal = RESET, NMI or IRQ 3/4/5/6/7/9/10/11/12/14/15

Watchdog Timer = 1/2/4/8/16/32/64/128/256/512 Seconds

The BIOS setup only offers a limited amount of time-out values. More a hiher resolution of timeout values refer to the next paragraph "Configuring the Watchdog Timer by Software" Note that in case of using the BIOS setup, the watchdog starts counting the moment it passes the BIOS setup. This means that if you set the time-out period to 1 second, the system will keep rebooting before being able to load operating system or software !

After you have finnished configuring you watchdog timer read "Timeout Status & Reset - INDEX 3CH" on page 12 and look at the example on page 15 to find out how to priodically reseting the timeout status to prevent the watchdog timer from invoking a RESET, NMI or IRQ.

Configuring the Watchdog Timer by Software

Chipset configuration registers

The M6117D configuration register INDEX 37H, 38H, 39H, 3AH, 3BH, 3Ch are used to control the watchdog functions and/or display its current status.

Enable/Disable watchdog - INDEX 37H

Bit	Value	Action
7	reserved	Do not modify the value of these bits!
6	0	Disable watchdog timer
	1	Enable watchdog timer
5-0	Other function	Do not modify the value of these bits!

Watchdog time out action - INDEX 38H

Bit	Value	Action
7-4	0000	No output signal
	0001	IRQ3
	0010	IRQ4
	0011	IRQ5
	0100	IRQ6
	0101	IRQ7
	0110	IRQ9
	0111	IRQ10
	1000	IRQ11
	1001	IRQ12
	1010	IRQ14
	1011	IRQ15
	1100	NMI
	1101	System RESET
	1110	No output signal
	1111	No output signal
3-0	Other function	Do not modify the value of these bits!

Watchdog timer - INDEX 39H, 3AH, 3BH

Index	3Bh	3Ah	39h
Bits	D7……D0	D7……D0	D7……D0
counter	[VSB……	……	……LSB]

For example

Index	3Bh	3Ah	39h	Time out
	00h	00h	01h	30.5µs
	00h	00h	02h	61µs
	00h	01h	00h	7.8 ms
	00h	02h	00h	15.6 ms
	01h	00h	00h	2 s
	02h	00h	00h	4 s
	FFh	FFh	FFh	512 s

Timeout Status & Reset - INDEX 3CH

Bit	Value	Action
7	0	Timeout has not occurred
	1	Timeout has occured
6		
5	1	Reset timer
	0	Has no meaning
4-0		Other function, do not modify these bits

Programming the watchdog

To perform any operation on the M6117D configuration registers you always have to unlock first and lock the registers afterwards

Unlock configuration register

```
mov al, 013h
out 22h, al
nop
nop
mov al, 0c5h
out 23h, al
nop
nop
```

Lock configuration register

```
mov al, 013h
out 22h, al
nop
nop
mov al, 000h
out 23h, al
nop
nop
```

Read the value of a configuration register

For example, read INDEX 3Ch :

Unlock configuration register

```
mov al, 03ch
out 22h, al
nop
nop
in al, 23h
nop
nop
push ax
```

Lock configuration register

```
pop ax ;AL - result
```

Write data to configuration register

For example, write 0FFh to INDEX 3Bh :

Unlock configuration register

```
mov al, 03bh
out 22h, al
nop
nop
mov al, 0ffh
out 23h, al
```

```
        nop
        nop
```
Lock configuration register

Watchdog Program Example

We use the following sequence to initialize the watchdog timer:

(1) Unlock configuration register.

(2) Disable watchdog timer by setting INDEX 37H Bit 6 to ‘0’.

(3) Set the expected counter value to INDEX 3BH, 3AH, 39H.

(4) Select timeout action from INDEX 38H Bit 7-4.

(5) Enable watchdog timer by setting INDEX 37H Bit 6 to ‘1’.

(6) Lock configuration register.

Example: Set timeout to 128 sec to generate a system RESET.

```
; Please use MASM to compiler the following program
; Execute under DOS environment
dosseg
. model small
. stack 100h
.code
main proc
        mov ax, 0c513h ; Unlock config. register
        call writechip
        mov ax, 03737h ; Disable watchdog timer
        call readchip
        and al, 10111111b
        xchg ah, al
        call writechip
        mov ax, 0403bh ; Set the expected counter
                       ; value
        call writechip ; to [400000h]
        mov ax, 0003ah ; 30.5*sec*400000h= 128 sec
        call writechip
        mov ax, 00039h
        call writechip
```

```
        mov ax, 03838h ; Select “system reset” as
                       ; timeout action
        call readchip
        and al, 00001111b
        or al, 11010000b
        xchg ah, al
        call writechip
        mov ax, 03737h ; Enable watchdog timer
        call readchip
        or al, 01000000b
        xchg ah, al
        call writechip
        mov ax, 00013h ; Lock config. register
        call writechip
        mov ax, 04c00h
        int 21h
        main endp
readchip proc
        out 22h, al
        nop
        nop
        in al, 23h
        nop
        nop
        ret
readchip endp
writechip proc
        out 22h, al
        nop
        nop
        xchg ah, al
        out 23h, al
        nop
        nop
```

```
        xchg ah, al
        ret
writechip endp
end main
```

Reset watchdog timer

Resets the watchdog timer periodically to prevent timeout.

```
        mov ax, 0c513h ; Unlock configuration
                       ; register
        call writechip
        mov ax, 03C3Ch ; Reset watchdog timer
                       ; counter
        call readchip
        or al, 00100000b ; The counter is reset at
        xchg ah, al ; out 23h, al
        call writechip
        mov ax, 00013h ; Lock configuration
                       ; register
        call writechip
```

(the above code uses readchip and writechip procedures)

Chapter 3
SVGA Setup

3.1 Introduction

The PC104-386V has an on-board VGA interface. The specifications and features are described as follows:

3.1.1 Chipset

The PC104-386V uses a TOPRO TP65081Q for its SVGA controller, which supports conventional analog CRT monitor or flat panel. In addition, it also supports interlaced and non-interlaced analog monitors (color and monochrome VGA) in high-resolution modes while maintaining complete IBM VGA compatibility. Multiple frequency (multisync) monitors are handled as if they were analog monitors.

3.1.2 Display Memory

With 1 MB memory, the VGA controller can drive CRT displays or color panel displays with resolutions up to 1024 x 768 at 256 colors.

3.2 Flat Panel BIOS and Wiring

Below is a list of optional Flat Panel SVGA BIOS. The VGA BIOS is combined with the system BIOS in a single. To change to another BIOS please contact your local dealer.

MLCD.dat - Data File for MONO DSTN640*480 **(Default)**

example : (1) HOSIDEN HLM6667

(2) HITACHI LMG5160XUFC

(3) CASIO MD650TS00-01

(4) OPTREX DMF_50260NFU-FW-8

DSTN.dat - Data file for Color DSTN640*480

example : (1) Sanyo LCM-5331-22NTK

(2) SHARP LM64C35P

TFT_S1.dat - Data File for TFT640*480-Sync (16 BIT)

TFT_S2.dat - Data File for TFT640*480-Sync (18/24 BIT)

example : (1) HITACHI TX26D60/TX24D55

(2) TOSHIBA LTM09C015A

(3) SHARP LQ10D321

TFT_LP1.dat - Data File For TFT640*480-LP (16 BIT)

TFT_LP2.dat - Data File For TFT640*480-LP (18/24 BIT)

example : (1) Toshiba LTM09c015A)

TFT86_S1.dat - Data File for TFT800*600_sync (16 BIT)

TFT86_S2.dat Data File for TFT800*600_sync (18/24 BIT)

example : (1) NEC NL8060AC26-05

(2) NEC NL8060AC26-04

(3) NEC NL8060BC31-02

EL.dat - Data File for EL640*480

example : (1) PLANAR EL640.480-A

PLASMA.dat - Data File for PLASMA640*480

example : (1) PANASONIC S817

CRT/Flat Panel Mode

All the above BIOS support either CRT only, Flat Panel only or CRT/Flat Panel simultaneously. To set the mode a Panel Switching Utility is used.

USAGE:

At DOS prompt type >***SW508*** then Screen will show

1. CRT Only
2. Panel Only
3. CRT/Panel Simutaneous

NEC NL6448AC33-18 wiring

NEC NL6448AC33-18		PC104-386V CON1	
Pin	**Pin Name**	**Pin**	**Pin Name**
CN1-1	GND	3	GND

CN1-2	CLK	35	SHFCLK
CN1-3	Hsync	38	LP
CN1-4	Vsync	36	FLM
CN1-5	GND	4	-
CN1-6	R0	27	P18
CN1-7	R1	28	P19
CN1-8	R2	29	P20
CN1-9	R3	30	P21
CN1-10	R4	31	P22
CN1-11	R5	32	P23
CN1-12	GND	33	-
CN1-13	G0	19	P10
CN1-14	G1	20	P11
CN1-15	G2	21	P12
CN1-16	G3	22	P13
CN1-17	G4	23	P14
CN1-18	G5	24	P15
CN1-19	GND	34	-
CN1-20	B0	11	P2
CN1-21	B1	12	P3
CN1-22	B2	13	P4
CN1-23	B3	14	P5
CN1-24	B4	15	P6
CN1-25	B5	16	P7
CN1-26	GND	39	-
CN1-27	ENAB	37	MDE
CN1-28	Vcc	43	Vcc

CN1-29	Vcc	44	Vcc
CN1-30	NC	-	-
CN1-31	NC	-	-

NEC NL6448AC30-10 wiring

NEC NL6448AC30-10		PC104-386V CON1	
Pin	**Pin Name**	**Pin**	**Pin Name**
CN1-1	CLK	42	SHFCLK
CN1-2	Hsync	38	LP
CN1-3	Vsync	36	FLM
CN1-4	DE	37	MDE
CN1-5	-	-	P0
CN1-6	B0	10	P1
CN1-7	B1	11	P2
CN1-8	B2	12	P3
CN1-9	B3	13	P4
CN1-10	-	14	P5
CN1-11	-	15	P6
CN1-12	G0	16	P7
CN1-13	G1	17	P8
CN1-14	G2	18	P9
CN1-15	G3	19	P10
CN1-16	-	20	P11
CN1-17	R0	21	P12
CN1-18	R1	22	P13

CN1-19	R2	23	P14
CN1-20	R3	24	P15
CN1-21	-	-	P16
CN1-22	-	-	P17
CN1-23	-	27	P18
CN1-24	-	28	P19
CN1-25	-	29	P20
CN1-26	-	30	P21
CN1-27	-	31	P22
CN1-28	-	32	P23
CN1-29	PVcc	5	LCD Vdd
CN1-30	Vcc	43	Vcc
CN1-31	MODE	44	Vcc
CN1-32	GND	3	GND
CN1-33	GND	4	GND
CN1-34	Vdd +12	1	+12
CN1-35	ENABKL	40	ENABKL
CN1-36	GND	39	GND

LJ32H028 wiring

LJ32H028		PC104-386V CON1	
Pin	**Pin Name**	**Pin**	**Pin Name**
CN1-1	D1	11	P2
CN1-2	D0	12	P3
CN1-3	D3	9	P0
CN1-4	D2	10	P1
CN1-5	CP2	35	SHF_CLK

CN1-6	GND	3,4	GND
CN1-7	CP1	38	LP
CN1-8	GND	33,34	GND
CN1-9	S	36	FLM
CN1-10	-	-	-
CN1-11	-	-	-
CN1-12	-	-	-
CN1-13	+5V	43,44	+5V(Vdd)
CN1-14	-	-	-
CN1-15	+12V	1,2	+12V

SHARP LQ10D42 wiring

(640 X 480 TFT Color)

SHARP LQ10D42		PC104-386V CON1	
Pin	**Pin Name**	**Pin**	**Pin Name**
CN1-1	GND	3,4	GND
CN1-2	CLK	42	SHFCLK
CN1-3	Hsync	38	LP
CN1-4	Vsync	36	FLM
CN1-5	GND	3,4	GND
CN1-6	R0	21	P12
CN1-7	R1	22	P13
CN1-8	R2	23	P14
CN1-9	R3	24	P15
CN1-10	R4	25	P16
CN1-11	R5	26	P17

CN1-12	GND	3,4	GND
CN1-13	G0	15	P6
CN1-14	G1	16	P7
CN1-15	G2	17	P8
CN1-16	G3	18	P9
CN1-17	G4	19	P10
CN1-18	G5	20	P11
CN1-19	GND	3,4	GND
CN1-20	B0	9	P0
CN1-21	B1	10	P1
CN1-22	B2	11	P2
CN1-23	B3	12	P3
CN1-24	B4	13	P4
CN1-25	B5	14	P5
CN1-26	GND	3,4	GND
CN1-27	ENAB	40	M
CN1-28	Vcc	43,44	Vcc +5V
CN1-29	Vcc	43,44	Vcc +5V
CN1-30	R/L	-	-
CN1-31	U/D	-	-

SHARP LQ12S31 wiring

(800 X 600 TFT Color)

SHARP LQ12S31		PC104-386V CON1	
Pin	**Pin Name**	**Pin**	**Pin Name**
CN1-1	GND	3	GND

CN1-2	CLK	35	SHFCLK
CN1-3	GND	4	GND
CN1-4	Hsync	38	LP
CN1-5	Vsync	36	FLM
CN1-6	GND	8	GND
CN1-7	GND	8	GND
CN1-8	GND	8	GND
CN1-9	R0	27	P18
CN1-10	R1	28	P19
CN1-11	R2	29	P20
CN1-12	GND	8	GND
CN1-13	R3	30	P21
CN1-14	R4	31	P22
CN1-15	R5	32	P23
CN1-16	GND	39	GND
CN1-17	GND	39	GND
CN1-18	GND	39	GND
CN1-19	G0	19	P10
CN1-20	G1	20	P11
CN1-21	G2	21	P12
CN1-22	GND	39	
CN1-23	G3	22	P13
CN1-24	G4	23	P14
CN1-25	G5	24	P15
CN1-26	GND	41	GND
CN1-27	GND	41	GND

CN1-28	GND	41	GND
CN1-29	B0	11	P2
CN1-30	B1	12	P3
CN1-31	B2	13	P4
CN1-32	GND	41	GND
CN1-33	B3	14	P5
CN1-34	B4	15	P6
CN1-35	B5	16	P7
CN1-36	GND	41	GND
CN1-37	ENAR	37	M
CN1-38	TST	-	-
CN1-39	Vcc	43	+5Vcc
CN1-40	Vcc	44	+5Vcc
CN1-41	TST	-	-

Warranty

This product is warranted to be in good working order for a period of one year from the date of purchase. Should this product fail to be in good working orderat any time during this period, we will, at our option, replace or repair it at noadditional charge except as set forth in the following terms. This warranty doesnot apply to products damaged by misuse, modifications, accident or disaster. Vendor assumes no liability for any damages, lost profits, lost savings or anyother incidental or consequential damage resulting from the use, misuse of, orinability to use this product. Vendor will not be liable for any claim made by anyother related party. Return authorization must be obtained from the vendor before returned merchandise will be accepted. Authorization can be obtained by calling or faxing the vendor and requesting a Return Merchandise Authorization (RMA) number. Returned goods should always be accompanied by a clear problem description.